Initial Project Information Document (PID)

Report No: AB138

Project Name	MEXICO-Large-scale Renewable Energy Development Project (Phase 1 = $25M; Phase 2 = $45M)
Region	Latin America and Caribbean Region
Sector	Renewable energy (55%); General finance sector (25%); Other industry (20%)
Theme	Technology diffusion (P); Environmental policies and institutions (S); Infrastructure services for private sector development (S)
Project	P077717
Borrower(s)	UNITED MEXICAN STATES
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1. Country and Sector Background

Power Sector Background:

Electricity demand growth during the 2001-2010 period is expected to be strong and greater than the growth rate of GDP. The base case scenario using a GDP growth rate of 5.2% estimates that electricity consumption will grow at an annual rate of 6.3% and energy demand at an annual rate of 6%. Government estimates indicate that it will be necessary to increase capacity by 32,219 MW during the 2001-2010 period, of which 10,854 MW are already committed or under construction. Given the current regulatory framework, self-supply and cogeneration projects are estimated to account for only 4,862 MW of the total capacity addition requirements. The planning scenario also considers retiring 1,661 MW of capacity (mostly older oil-fired thermal) during this period, for a net addition of 30,558 MW, or an 83% increase.

Given their relative efficiency and fuel price projections, the majority of capacity built or contracted by the public sector during the 2001-2010 period will be met with combined cycle gas turbines. **This trend will result in gas-based generation accounting for 52.1% of total generation by 2010, up from 9.2% in 2001,** while conventional thermal generation (fuel oil based) will reduce its contribution from 46.6% to 13.8%. Renewable energy sources (including large hydro) represent around 12% of energy additions. A low rate of capacity retirement resulting from government budgetary and financing restrictions is expected to persist (in the past decade only 816 MW of capacity was retired) and will leave numerous inefficient oil thermal and open-combustion gas units in operation.

Capacity Additions (MW)
2001-2010

	Committed	Not committed	Total	% share
Combined cycle	9,344	8,025	17,369	63.5
Repowering	272		272	1.0
Hydro	936	2,255	3,191	11.7
Coal		2,100	2,100	7.7
Combustion Turbine	134	83	217	0.8
Internal Combustion	51	161	212	0.8
Geothermal	118	5	123	0.4
Undefined		3,874	3,874	14.2
Total	**10,854**	**16,503**	**27,357**	**100.0**

Source: Prospectiva del Sector Eléctrico 2001-2010, Secretaría de Energía.

Electricity sector reform initiatives currently underway are not expected to proceed in their originally proposed form; specifically, partial unbundling and the creation of a wholesale electricity market are not expected to occur in the near future. More likely, a measure will be passed to codify or solidify private sector participation in generation so as to address ambiguities in the 1992 legislative reforms. There are also opportunities for reforms that will expand opportunities for renewable energy development, as these appear to enjoy support across a range of political interests.

Current situation of renewable energy in the Mexican power sector:

Currently, only a small portion of Mexico's total energy needs are met by renewable energy sources. In 2000, hydrocarbon based generation accounted for 60.7% of total installed capacity. The country's dependence on hydrocarbon based generation is even greater, however, when taking into account that while hydroelectric power accounted for 26.2% of total installed capacity, it only accounted around 14% of actual generation as insufficient water supplies exist for year-round production. Geothermal power is the second most important renewable source of energy in Mexico today, with a total capacity of 855 MW. It is followed by wind, with approximately 2 MW from 'La Ventosa' and 'Guerrero Negro'. Solar PV installed capacity, which is not connected to the grid, accounts for 14 MW.

Baseline Projections - Current projections considering available resources and the existing legal and institutional framework estimate that renewable energy capacity will grow by 3,752 MW over the 2001-2010 period (from 10,735 MW to 14,487 MW). Excluding large hydro and geothermal projects, the scenario of renewable growth capacity between 2001 and 2010, is reduced dramatically to only 438 MW, a small number when compared to the additional 27,357 MW in total generation capacity which must be built during this period to meet demand.

Baseline Renewable Energy Capacity Additions 2001-2010 (MW)

	Bagasse	Mini-Hydro	Wind	Solar	Biogas	Geothermal	Hydro	Total
2001	210	20.3	2.0	14	11	855	9,619	10,735
2010	246	225.0	187.0	24	17	978	12,810	14,487
Installed 2001-2010	36	204.7	181.3	10	6	123	3,191	3752
Investment Cost (USD/kW installed)	-	800-6000	1000	3500-7000	630-1170	1,340	740	
Total Investment Cost (millions USD)	-	163.7-1,228.2	181.3	35-70	3.78-7.02	164.8	2,361.3	2,910-4,013

Source: Prospectiva del Sector Eléctrico 2001-2010, Secretaría de Energía; CRE

In addition to this projection, the policy objectives laid out in the *Programa Sectorial* seek to augment these target and promote an additional 1,000 MW of renewable capacity, but recognizes that a significant policy push and supporting instruments will be required. The national electricity research institute (IIE) has performed analysis that has suggested that an even more aggressive growth scenario could be possible given the appropriate policies and regulations over the 2001-2010 period (below) .

Renewable Energy: Aggressive Expansion Scenario 2001-2010 (MW)

Wind	2,000
Small scale hydro	300 – 500
Biomass	150
Photovoltaic (solar)	10 – 20

Source: IIE

Policy Context

Mexican constitutional and legal framework establishes that the State has the exclusive power to generate, conduct, transform, distribute and supply electricity related to the provision of electricity for "public service" (Article 27). The Constitution limits private sector participation to IPP projects where all electricity generated is sold to CFE. For cogeneration, CFE is required to purchase surplus energy up to 20 MW. For self-supply projects, CFE is obligated to purchase surplus energy, but at rates equivalent to 85% of the short-run marginal costs of the most efficient units on the system. Currently there is no decentralization process in the electricity sector, nor is such a process likely under the current legal framework and political context. Article 3 of the Law for Public Electric Energy Service exempts the following activities from the definition of public service, thus establishing the scope for private sector participation in the electricity business:

- Self supply, through co-generation, or small generation (under 20 MW for sale to CFE or under 1 MW for supply of remote communities);
- Generation of electricity by independent producers for exclusive sale to CFE;
- Generation for export sales to neighboring countries (from co-generation, independent production, or small generation);
- Electrical energy import by individuals or formally established entities for self supply only;
- Generation for emergencies caused by interruption of public service.

End users typically pay electricity tariffs that are determined using the average cost of providing service, except for residential and agricultural irrigation tariffs, which are heavily subsidized. Municipal and

industrial customers pay higher tariffs to cover the costs of this subsidization. The low rate of capacity retirement for older systems has created a significant difference between system average and marginal costs. Thus, tariffs paid by industry, commercial establishments, and municipalities are well above the marginal cost of combined cycle gas turbines, and clear economic opportunities exist where the willingness to pay of these consumers exceeds the costs of renewable energy supply. (Some municipalities, for example, pay up to $0.19 per kWh).

Recent regulatory modifications permit indirect contracts between renewable energy private producers and consumers and allow for new generation/sales relationships to be developed. In September of 2001, the energy regulator (CRE) published special rules for interconnection contracts between CFE and suppliers of renewable energy which benefit self-suppliers whose consumption points are not adjacent to the production site, summarized as follows:

- Priority dispatch requiring that CFE must provide dispatch for RE providers whenever they generate power (recognizing that RE providers have limited control over when they can generate);
- Discounts on the transmission tariff levied by CFE (which can currently reach 50%);
- Energy Storage, obliging CFE to return unused energy to self-suppliers when required.

Key Barriers to Development of Renewable Energy in Mexico:

A key challenge to cultivating private development and investment in large-scale energy resources is CFE's existing Constitutional mandate of CFE to acquire energy at 'least cost' and its current interpretation in CFE procurement. Under the Electricity Law, SENER has the legal mandate to define methodologies for calculating costs based on long-run marginal costing principles, but has heretofore not utilized this approach, and the method for calculating least cost was in practice developed and applied by CFE. Addressing this definition is a key strategic objective of the program.

While combined cycle gas turbines have emerged as the prototypical least cost power source, gas price fluctuations (which have been significant in Mexico over the last several years) can upset this metric. As CFE carries the entire gas price risk for IPP's, the acquisition of least cost generation sources does not necessarily equate over time with least cost generation. The volatility of such price impacts can be further magnified by the high level of concentration in CCGT's which is emerging in Mexico and is expected to increase significantly over the next decade.

Widespread adoption of renewables would not displace major quantities of natural gas, but would complement gas while diminishing risks. In addition, accessing and maximizing the value of potential carbon credits would facilitate local and industrial development. While there is currently a broad opportunity to open the renewable energy market, this opportunity is time-limited: Mexico's efforts to expand the rate of gas-fired power installations, and the resulting increase in gas demand, are being met with an aggressive program to develop LNG ports and distribution system. Once this LNG infrastructure is in place, it will become politically more difficult to promote renewables.

The lack of a full enabling legal and policy framework for renewable energy has resulted in a low level of entrepreneurial and financial experience for RE projects. Partly as a result of the low level of RE activity, there has also been a lack of detailed resource assessments for some RE technologies and/or failure to integrate such information that is available.

Indicative Deal Flow of Grid-connected Renewable Energy Projects

Mexico has great potential for wind energy, small hydro plants, biomass and small geothermal plants. On wind energy, the potential is due to the exceptional wind resources available in the southern regions of the country. Most of the wind power plants are likely to be developed in the region of Oaxaca where the geography of the area provides a world class wind resource estimated to have a potential for more than 3,000 MW of installed capacity. On small hydro, a large number of competitive projects can be developed due to the existence of numerous abandoned small projects that can be refurbished and thus present small capital cost investment needs. The biomass potential is related with the availability of sugar industry plants that are currently looking into developing biomass power plants.

Actual renewable energy investments related to the GEF project will only become final after the conclusion of auctions under the financing mechanism. However, under the auspices of the September 2001 legal framework (that enables private sector renewable energy power plants to sell electricity for "auto-consumption") there have been clear indications that a strong pipeline of prospective renewable energy projects is developing. Information about the development of renewable projects (particularly wind and small hydro) have been made available to the World Bank by interested parties inquiring about financing from the Prototype Carbon Fund. The main barrier for these projects is the uncertainty of financial cash-flows --related with the credit risk of power consumers, that need to be partners in the projects in order to buy electricity using the auto-consumption law. Under the proposed financing mechanism of this GEF project, this risk will be minimized since payments with the competitively allocated tariff support will be arranged directly with the national electricity provider, CFE.

Identified Projects Currently Under Development:

Fuerza Eolica is currently developing a wind project in Oaxaca in two phases for a total of 150 MW. The first phase aims to build 51 MW and sell part of the electricity produced to the cement company Cruz Azul. The project has all administrative permits and approvals and has obtained initial equity financing from the Deutsche Bank Scudder Latin American Power Fund, while it is currently negotiating debt financing with a number of different institutions (including BANOBRAS), and export credit agencies. Fuerza Eolica is also developing a 30 MW wind facility in Cozumel, which is expected to be developed within the next two years.

CISA is developing a number of renewable energy projects in different parts of Mexico, and has a partnership with Gamesa, the Spanish turbine maker, to develop a number of wind farms in Oaxaca with the first to be a 20 MW facility, the Binestipa Project, planned by 2004. They are also partnered with Guascor, another Spanish company, to develop wind projects and mini-hydros in Baja California and other areas of the country. The company has obtained land rights for wind power installations and is working to obtain operating permits.

Eneolica is a project developer focusing on wind farms and other opportunities in Oaxaca, and is partnered with Grupo Foster of Spain to help assess projects and share development costs. They are studying a 40 MW wind project that is in an early state of development, however the company is already entering into contractual agreements with land owners for the rights to install wind turbines.

Guascor is a Spanish company focused in engine manufacture and energy development and is affiliated with Gamesa, a turbine manufacturer. Guascor is developing a wide array of renewable projects such as biomass, oil recycling, and animal waste energy generation, as well as more traditional renewable projects such as mini-hydro and wind farms as well. They are targeting a total potential of 400 MW of

wind farms in Oaxaca, for which they are entering into agreements with land owners, and their most advanced project is a 3 MW mini-hydro facility in Puebla.

Deproe is currently developing a 67 MW facility in Oaxaca to sell electricity to four different municipalities in the Mexico Valley. Specific details were provided about investment costs, production costs, financing, difficulties experienced, and leasing arrangements with the *ejidos* and land owners. The project developers are SIIF Energie and Deproe as equity partners, and Credit Agricole Indosuez and BANOBRAS as debt providers. The company has an overall target to build more than 200MW of wind power plants in Oaxaca with the backing of SIIF. Moreover, Deproe has years of experience in developing small hydroelectric projects and is currently developing a 17 MW hydroelectric plant.

Endesa currently owns a number of small gas-fired cogeneration facilities totaling 25 MW in Mexico, and plans to expand to others as well as develop renewable projects. Endesa has reserved land to develop two or three 25 to 30 MW wind farms in Oaxaca, expected to be operative in two years.

Comexhidro/INELEC is a mini-hydro developer already making fast progress with the World Bank's PCF regarding a number of projects totaling about 60 MW. The company has a strong pipeline of an additional 50-100 MW that can be economically developed with some tariff support.

CFE (the national electricity company of Mexico) is preparing the development of a 50 MW wind power plant also for the region of Oaxaca. The company is considering submission of the project for approval in the national budget of 2004 while it has indicated that it can access favorable financing terms with the German development bank KfW (Kreditanstalt fuer Wiederbau). Moreover, CFE has prepared a list of small hydro plants that can become competitive with some concessional tariff support.

The degree to which any of these above projects may receive GEF support will hinge on their financial analysis and their participation in the competitive tenders.

2. Objectives

The development objective of the proposed project is to assist Mexico in stimulating and accelerating the commercialization of renewable energy applications and markets, particularly at the grid-connected level, in order to reduce greenhouse gas (GHG) and other emissions while responding to increasing energy demand and energy diversification imperatives necessary for sustainable economic growth.

To reach this objective, the project proposes a two-phase approach to address key policy and tariff issues currently hindering renewable energy development, and facilitate initial investments with use of GEF support in a competitive Financial Mechanism to overcome initial investment barriers. Based on an adequate framework and market entry in the 3-year, $25 Million Phase I, the project would continue project replication and cost reduction in an anticipated $45 million Phase II.

Global Objective

The global objective, per GEF Operational Policy #6, is to address and reduce the barriers to development of grid-connected renewable energy technologies and markets in Mexico.

Mexico has a broad array of world-class renewable energy resources, but has developed very few of these resources due to the historic availability of domestic oil and gas and a Constitutionally-based mandate to acquire only least-cost electric power resources. For Mexico, the project will significantly contribute to their objective of diversifying the electricity sector (cost and supply) , while providing significant

additional renewable energy (RE) capacity, organizational learning, and cost reductions in wind and other technologies.

While many of Mexico's emissions issues are related to the transport sector, and its growing fraction of natural gas in the power sector reduces overall emission intensity, there are significant local and global benefits associated with reducing GHG intensity in the power sector.

The project is also seen as a significant broadening of World Bank and GEF experience, particularly in stimulating grid-scale renewable energy technology. Previously, the World Bank has worked with GEF in developing and implementing the India Renewable Resources Development Project which helped introduce large scale wind energy to India. More recently, the World Bank has been working with China on the China Renewable Energy Scale-Up Program, which seeks to create a mandated market share and associated certificate trading mechanisms as an approach to enlarging markets. This project for Mexico will demonstrate important linkages between policy/pricing considerations and GEF incentive support delivered in a competitive, cost effective framework, enlarging the GEF toolkit for future projects.

Mexico is a regional industrial and technical leader with strong relations throughout Latin America, and is well positioned to extrapolate experiences in policy and technology. Further, while Mexico is a developing country, it is also an OECD country, a fact which has inhibited flows of soft donor financing that would have otherwise been attracted by the significant renewable energy resource in the country. OECD and NAFTA linkages position Mexico to be a global player in renewable energy policy and technology.

3. Rationale for Bank's Involvement

The World Bank and GEF, in collaboration with other bi-lateral agencies, have engaged a broad array of Mexican policy, technical, financial, and environmental agencies and actors in building consensus on the need for diversification of the Mexican energy sector, the potential benefits of developing in-country renewable energy resources as a means to achieve such diversification, and the technical assistance and program approaches required to stimulate and sustain long-term renewable energy development. SENER and other agencies have acknowledged the World Bank and GEF value added in (a) providing objective information on international experience and tailoring it to Mexican circumstances, (b) identifying and collaborating with a range of technical, financial, and policy experts both within and outside of Mexico, and (c) defining and carrying out key analyses required to inform the decision-making process.

Based on relationships and mutual trust developed during this process, the World Bank and GEF are well positioned to further development of the project while incorporating its broad experience in power sector reform, renewable energy technologies and markets, and emerging financing potential from carbon mitigation sources, making the project an example of international best practice for large scale renewable energy development. The key role of the World Bank will be to continue to provide oversight on coordination of the various TA components, and keeping a sustained focus on the least-cost power issue to ensure cost-effective use of GEF funds applied through the Financial Mechanism.

4. Description

Technical Assistance:
- Least Cost Analysis
- System Operations
- Business Development
- Market Development

Financial Mechanism
- GEF (17 M)
- Local Commercial Finance (65 M)
- International Commercial Finance (150 M)
- Bilateral co-financing (25 M)

5. Financing

Source (Total (US$m))

BORROWER/RECIPIENT ($7.50)
GLOBAL ENVIRONMENT FACILITY ($25.00)
LOCAL SOURCES OF BORROWING COUNTRY ($65.00)
BILATERAL AGENCIES (UNIDENTIFIED) ($25.00)
FOREIGN PRIVATE COMMERCIAL SOURCES (UNIDENTIFIED) ($150.00)
Total Project Cost: $272.50

6. Implementation

Implementation Period: Phase I of the project is expected to be approximately 30-36 months in length; initiation of Phase II will be a function of the success of activities in Phase I and meeting trigger conditions. Phase II is expected to be approximately 5 years.

Program Oversight and Management: The Ministry of Energy (SENER: Secretaría de Energía,

responsible for policy, regulation, strategy and coordination of the energy sector) will serve as the Executing Agency for the project, and will take a lead role in project development, interagency coordination, policy coordination, and project monitoring and evaluation.

BANOBRAS will be the implementation entity (under a project implementation legal agreement between SENER and BANOBRAS) which will be responsible for all procurement for the technical assistance activities and under the Financial Mechanism, and for financial management and disbursement activities. It will provide central implementation role in two areas:

- Development and execution of the Financial Mechanism, where it will coordinate with SENER and CFE on preparation, issuance, and review of the competitive tenders for renewable capacity, and will execute contracts for delivery of incentive support under agreed conditions;

- Providing coordination and technical/financial assistance for private RE generators and their private and municipal clients in closing projects under the 'self-generation' window permitted under the 2001 CRE regulations.

As a Mexican Development Bank, BANOBRAS is an important government instrument providing financing and technical assistance services for the Federal government, State and Municipal Governments, and the private sector in conjunction with infrastructure investments (roads, water, sanitation, etc.). With these entities, and increasingly with the private sector and other credit institutions and various social organizations, it works to promote and support financial mechanisms for social welfare, housing, urban regional development, and environmental protection. BANOBRAS has worked as a finance agent for other World Bank and GEF projects, including the recent successful implementation of the WB/GEF Landfill Gas Capture Project in Monterrey.

Project Financial Management:

By project appraisal, BANOBRAS (with the WB, SENER, CFE, and other agencies, and through activities supported under the GEF PDF-B funds) will prepare a detailed project implementation plan addressing:

- Detailed procedures and operational manual for the financial mechanism.
- Detailed work plan for technical/financial assistance to 3rd party self generators.
- Financial management.

It is proposed to set up a Special Account in the Mexico Central Bank in the name of BANOBRAS. The account will be used to support BANOBRAS' procurement of primarily consulting services under the Technical Assistance component. These procurements will follow standard Bank consultant services guidelines and will be subject to the Bank's *ex ante* procurement review for amounts exceeding thresholds to be established at project appraisal.

The account will also support BANOBRAS' procurement of renewably-generated power under the terms and conditions to be established in the detailed rules for operations and bidding under the Financial Mechanism. BANOBRAS will conduct the tariff support subsidy reverse auction using bidder pre-qualification and bid award criteria to be specified in the fund design. Bid awards, initially in the form of an letter of intent (LoI) and then formalized in the form of a green energy power purchase contract once evidence towards sub-project financial closure is presented, will be subject to a pre-award review by the Bank for consistency of the bidding process and bid evaluation with agreed fund

management criteria. Following bid award clearance and commencement of sub-project operations, BANOBRAS will process periodic (quarterly or semi-annual) payments to the awardee project sponsors on the basis of CFE-certified invoices for delivery of renewable power. BANOBRAS will then apply for drawdown and replenishment of the Special Account on the basis of procedures to be defined by appraisal, i.e., either through submission of SOEs or based on submissions under the Bank's LACI financial management and disbursements framework.

Other key entities involved in the effective development and implementation of the program will include:

- Energy Regulatory Commission (CRE: Comisión Reguladora de Energía).
- National Commission for Energy Conservation (CONAE).
- Ministry of Finance and Public Credit (SHCP: Secretaría de Hacienda y Crédito Público).
- Federal Electricity Commission (CFE).
- Ministry of the Environment and Natural Resources (SEMARNAT).
- Institute of Electric Research (IIE: Instituto de Investigaciones Eléctricas).
- National Waters Commision (CAN: Comisión Nacional del Agua).
- Private Actors in Renewable Energy: Asociación Nacional de Energía Solar (ANES), Asociación Mexicana de Economía Energética (AMEE), and Cámara Nacional de Manufacturas Eléctricas (CANAME).
- Academic Institutions: Universidad Nacional Autónoma de México (UNAM), Insituto Politécnico Nacional (IPN), and Universidad Autónoma Metropolitana (UAM).

7. Sustainability

The renewable energy sub-projects resulting from the WB/GEF project are expected to be operated as IPP generation facilities under a clear tariff and contractual relationship with CFE or industrial/municipal customers, which will provide clear incentives for private sector developers and operators to maintain and operate their facilities in a financially sustainable manner.

Key issues underlying the sustainability of the project include:

- The continued commitment by the Government of Mexico, and CFE in particular, to engage in pricing on a system basis and to incorporate a broader analysis of costs of benefits of renewable energy generation to create market entry points for renewables while remaining consistent with the intent of ‘least-cost’ power procurement guidelines expressed in Mexico’s Constitution.
- The ability of the program to bridge the gap with available GEF funds between an expressed CFE base offer price and the prices required initially by wind developers to open the market.

Subject to these conditions being adequately addressed, it is expected that the trajectory of the project will bring wind and other renewable energy technologies into approximate price parity with conventional sources by the end of the project, making the effort self-sustaining.

8. Lessons learned from past operations in the country/sector

Lessons learned at the international or OECD level, including those of Renewable Energy Portfolio Standards, Feed-In Laws, Non-Fossil Fuel Obligations, Systems Benefit Charges, and other incentive programs, have already been described in this document and are reflected in the project design. These include the impracticality of introducing an RPS or mandated market in the Mexican single-utility system, the high costs and political difficulty of supporting feed-in laws or systems-benefit funding sources in Mexico, and the specific need in Mexico to address the institutional narrow focus on least-cost power procurement. Additional lessons from World Bank projects co-financed with GEF sources are described below.

GEF Experience

The Global Environment Facility, the primary partner of the World Bank in efforts to remove barriers to the development of renewable energy and mainstream these technologies into Bank operations, has sponsored a number of studies that review world-wide experience.[1]

The main lessons derived from these reviews are:

- Policies that promote production-based incentives rather than investment-based incentives are more likely to spur the best industry performance and sustainability.
- Power-sector regulatory policies for renewable energy should support IPP/PPA frameworks that provide incentives and long-term stable tariffs for private power producers.
- Utilities and regulators need skills to understand the complex array of policy, regulatory, technical, financing, and organizational factors that influence whether renewable energy producers are viable.
- Financing for renewable power projects is crucial but elusive, and requires that key risks (clear and stable power purchase contracts, capacity payments, and up-front capital requirements of renewables) be addressed in to level the playing field and allow renewables to compete with conventional sources.

Specifically for wind power, direct lessons can be drawn from previous GEF projects:

India: During the 1990's, under the Renewable Resources Project, the GEF and the World Bank directly financed 41 MW of wind turbines and 45 MW of min-hydro capacity in India. The project also strengthened the capabilities of the India Renewable Energy Development Agency (IREDA) to successfully promote and finance additional private sector investments.

GEF support for wind power occurred in parallel with the explosive market growth that emerged in the mid-1990's fueled by favorable investment tax policies and a supportive regulatory framework. As a result, and in keeping with international trends, installed costs for wind declined from around $1,200/kW in 1991 to $815-1,010/kW in 1998.

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[1] these include (i) Eric Martinot and Oscar McDoom, "Promoting Energy Efficiency and Renewable Energy, " June 2000, GEF, Washington, DC, (ii) Alan S. Miller and Eric Martinot, "The Global Environment Facility: Financing and Regulatory Support for Clean Energy," Natural Resources and Environment, Vol. 15, No. 3, 2001, (iii) Eric Martinot, "The GEF Portfolio of Grid-Connected Renewable Energy: Emerging Experience and Lessons," 2002, GEF, Washington, DC, (iv) Eric Martinot, "Grid-based Renewable Energy in Developing Countries: Policies, Strategies and Lessons from GEF, "2002, GEF, Washington , DC, and (v) Eric Martinot, A. Chaurey, D. Lew, J. Moreira, and N. Wamukonya, "Renewable Energy Markets in Developing Countries," Annual Review of Energy and Environment, 2002.

In the 1990's one-year 100% investment tax depreciation provided large economic gains for installation of wind farm capacity, regardless of the electricity generation that resulted. This incentive helped drive the installation of the almost 1,200 MW of wind capacity in India, virtually all by the private sector. However, a number of these turbines are currently not operating, substantiating the lesson that output-based incentives are preferable to investment-based incentives.

China: The emerging experience from the World Bank/GEF Renewable Energy Development project in China highlights the pressing need to address regulatory frameworks and find ways to reduce risks to project developers, The project was designed to finance four newly formed wind farm companies for construction of 190 MW of wind farms in Inner Mongolia, Hebei, Fujian, and Shanghai provinces. These companies were to be jointly owned by the State Power Corporation and subsidiary electric power utilities (at regional, provincial, or municipal levels) and would sell power to utilities under power-purchase agreements developed through the project.

The costs of wind-generated electricity from the wind companies would be higher than those of conventional generation, but utilities in three provinces (Hebei, Fujian, and Shanghai) were initially willing purchase this wind power because the added costs of wind power were marginal relative to total utility revenue for these three utilities. This willingness to bear the higher costs disappeared after power sector institutional changes. As a result, plans for 170 MW of the initial 190 MW wind capacity additions were cancelled.

The general lesson offered by this experience was that some explicit mechanism must be in place to finance the difference between renewable energy and conventional power generation costs, and that relying on the power utility's willingness to bear the higher costs is not sound policy. These lessons have been incorporated in the current China Renewable Energy Scale Up Program (CRESP) which seeks to introduce a mandated market policy in China that will commit all utilities to the same targets and introduce certificate trading mechanisms to facilitate their meeting these objectives at least cost for the country.

Costa Rica: In Costa Rica, a significant private-based wind-power industry has emerged from new dialogues and policy frameworks promoted by an IDB/GEF project. The private sector installed a 20 MW wind farm and began operating in 1997. Early project preparation activities, including institutional and technical feasibility studies, engendered favorable perceptions and regulatory frameworks for wind, including very strong power purchase agreements. Under the project, an additional 20 MW of wind capacity has been installed.

While the project took longer to develop than anticipated, and was thus unable to achieve all outcomes, key lessons resulted. Among these are that regulatory frameworks, technology perceptions, and studies that address non-technical issues and risks may be more important than mitigation of perceptions of technical risk through hardware demonstrations. This lesson is similar to that suggested by the Mauritius project described below.

Bagasse Power in Mauritius: In Mauritius, a World Bank/GEF bio-energy project indirectly catalyzed dramatic changes in electricity generation in the country. From 1994 to 1996, the project dispersed $6 million for efficiency investments in sugar mills to provide surplus bagasse for power generation. The project also provided technical assistance and technology demonstrations to promote private/public sector cooperation in power plant ventures and evaluate ways to decrease the transport costs for bagasse and to optimize the use of sugar cane for power generation. This TA helped to formulate a framework for independent power producer (IPP) development and an administrative focal point for private/public

partnership in IPP development.

Small Hydropower in Sri Lanka: The World Bank/GEF Energy Services Delivery project begun in 1997 points to the difficult and time-consuming nature of evolving business and regulatory models suitable to a given country and the flexibility needed to support approaches that show promise. The project financed more than 21 MW of small hydro by IPPs, along with development of a regulatory framework, including standardized power-purchase tariffs and contracts (PPAs).

The key lesson from this project is that the power purchase tariff offered to IPPs must be carefully structured so that tariffs have some stability over time, and are able to pay for both the energy as well as capacity that they provide, recognizing that power generation from renewable sources can vary significantly.

A Distillation of Key Lessons: These GEF and international lessons have been incorporated into project design, and reflect both the high level of commitment by SENER and CFE in accurately valuing renewable energy sources and currently available sources of financing to stimulate these markets. The combination of clear policy and tariff commitments with competitively sourced incentives represents a hybrid of other international approaches uniquely suited to the Mexican context.

9. Environment Aspects (including any public consultation)

Issues : There are no major negative environmental issues expected to result from the project. In general, impacts from the project will result in environmental improvement in terms of reduction of SOx, NOx, particulate, and global carbon emissions that would otherwise be generated by fossil-fuel fired plants. The environmental impacts that do result from renewable energy installations can be effectively managed and potentially include:

- Visual, bird-strike, and land-use impacts that can result from wind turbine operation. The project will employ international best practice in minimizing these impacts. The land-use impacts will be addressed also as part of the social issues of the plan and will seek to permit most effective mixed-use of the sites to retain traditional grazing and agricultural activities in conjunction with wind generation.
- Impacts from biomass, small-hydro power, and small geothermal installations expected to be addressed in the second phase of the project will general be small and local, and will similarly be managed according to best practice. Small hydro installations will typically utilize existing impoundments so significant new impacts are not anticipated.

10. List of factual technical documents:

11. Contact Point:

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12. For information on other project related documents contact:

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.